Map 97

Plate 1

GEOLOGIC MAP OF THE ST. GEORGE BASIN

Modified from Hamblin (1986; in press a and b) and Cook (1960)

DESCRIPTION OF MAP UNITS

adapted from Hamblin (1986; in press, a and b)

SEDIMENTARY ROCKS

- **Qe** Eolian deposits (Holocene)— *Medium- to fine-grained wind blown sand derived largely from erosion of the Navajo Formation*
- **Ql** Landslide deposits (Holocene)— *Masses of angular unconsolidated poorly sorted debris derived from slumping of basalt ridges or blocks of Navajo Sandstone*
- **Qa** Alluvium and low-level alluvial terraces (Holocene and late Pleistocene)— *Sand and minor gravels and mud deposited in stream channels, adjacent flood plain, and alluvial fans. Low-level terraces are approximately 23 feet (7 m) above the present drainage*
- **QTa** High-level alluvial terraces (Pleistocene and Pliocene)— *Gravel and sand preserved in segments of stream terraces up to 197 feet (60 m) above the present stream gradients, as much as 98 feet (30 m) thick; and alluvial gravel and sand capping the highest terraces not obviously associated with present drainage systems*
- **Tc** Claron (Wasatch) Formation (mostly Eocene and Oligocene, but locally the base may be as old as late Cretaceous or Paleocene)— *Thin- to thick-bedded fluvial and lacustrine sandstone, limestone, conglomerate, and shale (Rowley and Barker, 1978); approximately 476 feet (145 m) thick in the area of the Pine Valley Mountains (Cook, 1960)*
- **K** Cretaceous undivided— *Interbedded gray sandstone and shale equivalent to the Dakota, Tropic, Straight Cliffs, Wahweap, and Kaiparowits formations. The Upper Cretaceous section in the northwest corner of the study area is approximately 3838 feet (1,170 m) thick (Cook, 1960)*
- **Je** Entrada Formation— *Friable red chocolate and greenish-white sandstone, maximum thickness 249 feet (76 m) (Cook, 1960)*
- **Jc** Carmel Formation— *Gray micritic to argillaceous limestone and weak red gypsiferous shale, siltstone, and sandstone; approximately 656 feet (200 m) thick*
- **JTrn** Navajo Sandstone— *Medium- to fine-grained quartz sandstone with conspicuous large-scale cross bedding. Consists of well-sorted quartz loosely cemented with calcium carbonate and iron oxide. Well developed joint patterns. Thickness ranges from 1968 to 2395 feet (600 m - 730 m)*
- **Trk** Kayenta Formation— *Lower part is non-resistant slope-forming grayish-red to pale reddish-brown siltstone and silty mudstone, 49 to 492 feet (15 m - 150 m) thick. Upper part consists of massive red sandstone, 328 to 426 feet (100 m - 130 m) thick*
- **Tro** Moenave Formation— *Reddish-brown to orange siltstone and sandstone. Composed of a non-resistant 230 feet (70 m) thick lower sequence and an upper cliff-forming unit with a maximum thickness of 115 feet (35 m)*
- **Trc** Chinle Formation— *Variegated hues of red, purple, yellow, and gray shale interstratified with claystone, siltstone, and minor sandstone and conglomerate. A non-resistant unit about 426 feet (130 m) thick*
- **Trs** Shinarump Conglomerate— *Medium- to coarse-grained sandstone with lenses of conglomerate and shale. Thickness seldom exceeds 98 feet (30 m)*
- **Trm** Moenkopi Formation- *Includes the following five members: 1) Upper Red Member —426 to 459 feet (130 m - 140 m) of red laminated mudstone, siltstone, and fine- to medium-grained sandstone; 2) Shnabkaib Member — up to 689 feet (210 m) of interbedded white and pink gypsum, olive-gray dolomitic and gypsiferous shale, and red siltstone; 3) Middle Red Member — 164 to 197 feet (50 m - 60 m) of red laminated siltstone, mudstone, and fine-grained sandstone with minor layers of white to gray gypsum; 4) Virgin Limestone Member — 164 to 180 feet (50 m - 55 m) of gray micritic limestone alternating with gray calcareous mudstone; and 5) Lower Red Member — 230 to 344 feet (70 m - 105 m) of red-brown shaly limestone and mudstone with minor beds of sandstone and lenses of gypsum*
- **Pk** Kaibab Limestone— *A lower unit of gray massive cherty cliff-forming limestone 230 to 328 feet (70 m - 100 m) thick and an upper non-resistant gypsiferous gray to red silty shale 115 to 164 feet (35 m - 50 m) thick*
- **Pt** Toroweap Limestone— *Gray massive cherty limestone and gypsiferous gray to red silty shale. Consists of three units with total thickness of about 535 feet (163 m)*

IGNEOUS ROCKS

- **Qb_2** Holocene basalts— *Dense black vesicular olivine basalt with sparse olivine phenocrysts in a glassy groundmass. Includes flows less than 1,000 years old*
- **Qb_1** Holocene and Pleistocene basalt— *Medium-grained basalt with ophitic and locally diktytakitic texture. Includes flows between 1,000 years and 0.25 m.y. old*
- **Qc** Volcanic cinders (Holocene and Pleistocene)— *Basaltic cinder cones*
- **QTb** Pleistocene and Pliocene basalt— *Black to medium-gray vesicular basalt with gray plagioclase phenocrysts and clear embayed xenocrysts of quartz up to several millimeters in diameter. Includes flows between 1 m.y. and 2 m.y. old*
- **Tb** Tertiary basalt (Neogene)— *Dense black vesicular basalt. Includes flows older than 2 m.y.*
- **Td** Tertiary dacite (Pliocene)— *Gray, porphyritic dacite flow northeast of Central with phenocrysts of hornblende, biotite, plagioclase, and sanidine. Flow dated at 3.1 ± 0.2 m.y. old*

MAP SYMBOLS

- Contact
- Normal fault — *bar and ball on downthrown side; dashed where approximate; dotted where covered.*
- Anticline
- Hot spring

14° True North / Magnetic North

Approximate mean declination, 1982

UTAH

Location Map

0 1 2 3 4 miles

0 1 2 3 4 5 6 kilometers